

**Damen Digital**

Requirements Remote Services 1.0

Logistics Healthcare Automotive Industrial Automation Machine & Systems Energy & Utilities

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# Introduction

This document specifies the requirements for the Remote Services application in the Damen Digital program. The first version, Remote Services 1.0, is targeted to pilot users.

Damen Digital aims at setting a standard IoT solution for vessels and cloud to enable a large portfolio of data driven applications. The portfolio of data driven applications is specified in a roadmap document [1]. The standard IoT solution is specified in the blueprint architecture [2].

Remote Services provides through a graphical web interface real time information on a set of indicators about the service condition of the equipment on a ship. Its intended users are maintenance engineers and maintenance managers.

In order to function it has a number of prerequisite requirements:

*Prerequisites*

* *An on-vessel IoT field gateway that takes care of collecting on-board machine data*
* *An on-vessel communication device that takes care of data communication between the vessel and the central Damen IoT cloud*
* *A central Damen IoT cloud that stores all collected data of all connected vessels*
* *Two central web based applications:*
  + *The Device Management web application will allow service users to manage the on-vessel field gateway*
  + *The Communication Management web application will allow users to manage the vessel to cloud communication and the on-vessel communication device.*

The prerequisite requirements are not listed in this document.

# Document details

|  |  |
| --- | --- |
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# Document conventions

**Priority of requirements**By giving the requirements relative priority the development team can focus on those requirements that have the biggest business value. The priorities are defined according to the [MoSCoW Method](https://en.wikipedia.org/wiki/MoSCoW_method):

|  |  |
| --- | --- |
| **Prio** | **Description** |
| **Must** | **This functionality must be implemented in the release. Without this functionality, the product is not usable.** |
| **Should** | **These requirements are very desirable, however, without them the product is still usable.** *(For instance because there is a work-around).* |
| Could | This functionality will only be implemented when there is enough time, or when this functionality can easily be implemented while implementing other functionality. |
| Won’t | This functionality will not be implemented in this project. This functionality may still be relevant and implemented in a future release. |

For extra clarity, the **Must and Should-requirements will be printed bold** and Won’t-requirements will be printed red.

In general, for a first release the following implementation strategy is followed:

* All Must-requirements will be implemented;
* Most of the Should-requirements will be implemented.
* Several the Could-requirements will be implemented;
* None of the Won’t-requirements will be implemented.

Any requirement not implemented will be mentioned in the release notes.

**Remarks**In this document some paragraphs are *printed italic*. These *italic texts* do not contain extra requirements. They contain extra clarification or remarks relevant for the implementation.

# System Overview

The requirements in this document are based on the following schematic system overview. The system will require a Remote Services dashboard.



# High level requirements

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| --- | --- | --- |
| **Req. ID** | **Prio** | **Description** |
| **RS-Application** | **Must** | **The system shall contain a Remote Services application**  *This application requires in this version of Remote Services no subscription, only a login-account for a role with sufficient rights.* |

Additional, the system has several generic features:

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| **Req. ID** | **Prio** | **Description** |
| **RS-WEBBASED** | **Must** | **The Remote Services application shall be web based.** |
| **RS-SUBSCRIPTION** | Won’t | The Remote Services application shall be subscription-based.  *Not in this release.* |
| **RS-ANYPLACE** | **Must** | **The Remote Services application shall be accessible from any place.**  Remote Services can be accessed from any internet location. The application shall require authentication, authorisation and encrypted communication. |
| **RS-ANYDEVICE** | **Must** | **The Remote Services application shall be accessible from any web based device.**  The web-based application shall be responsive to the device on which it is used.  Remote Services will work on recent browser versions, i.e. on maximal one version behind the latest version. |
| **APP-AUTHENTICATION** | **Must** | **Remote Services shall include user authentication through username and password**  The user authentication process shall be equal to the authentication process for other Damen Digital applications, such as Connected Ship.  Single sign on with Damen Active Directory infrastructure is not yet taken into account. |
| **APP-SELFSERVICE** | **Must** | **Remote Services users are allowed to self-service their account**   * Username * Address * Reset password |
| **CS-AUTHORIZE** | **Must** | **Users access to the Remote Services application and data shall be based on assigned roles and scope.**  This scope relates to the set of vessels for which a user has the rights to manage them. |

# Remote Services requirements

Vessels of Damen exist in many configurations with respect to

* Number of engines
* Number of generators
* Availability of winches and cranes
* Etc.

The Remote Services application shall have knowledge of the vessel configuration, to present the correct dashboard. There shall be one Remote Services application to support all configurations. How the configuration is known to the Remote Services application is to be technically designed:

Two options can be:

* Vessels shall be explicitly configured in the cloud, before being usable in the Remote Services dashboard.
* The Remote Services application shall use implicit information; if no information is available for certain elements, then it will assume that these elements are not present on the vessel.

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| **Req. ID** | **Prio** | **Description** |
| **RS-DASHBOARD** | **Must** | **Remote Services consists of one web-based dashboard with the following sections**   * **Vessel Identification** * **Maintenance dates** * **Hull and propeller** * **Machinery Maintenance Indicators** * **Machinery Condition** |
| **RS-DASHBOARD-SWITCH** | **Must** | **Users will automatically see the dashboard after authentication if they are entitled to exactly one vessel.** |
| **RS-VESSEL-SELECTION** | **Should** | **Users will get a vessel selection screen after authentication to select the scope of the dashboard.** |
| **RS-DASHBOARD-DESIGN** | **Should** | **The Remote Services dashboard shall be based on a graphical design**  The following is an impression on how the graphical design can look like |

## Vessel Identification

The Vessel Identification section informs the user about the identity of the vessel: Based on a set of presented information elements (name, IMO number, location, etc) the user can determine the vessel.

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| --- | --- | --- |
| **Req. ID** | **Prio** | **Description** |
| **RS-VESSELNAME** | **Must** | **The vessel identification section shall contain the vessel name.**  The vessel name is configuration data; it is part of the vessel configuration that is entered through the IoT Management application. |
| **RS-VESSELIMO** | **Must** | **The vessel identification section shall contain the vessel IMO number.**  The IMO number is configuration data; it is part of the vessel configuration that is entered through the IoT Management application. |
| **RS-VESSELPICTURE** | **Must** | **The vessel identification section shall contain a vessel picture.**  The picture is configuration data; it is part of the vessel configuration that is entered through the IoT Management application. |
| **RS-VESSELMMSI** | **Must** | **The vessel identification section shall contain the vessel MMSI number.**  The MMSI number is configuration data; it is part of the vessel configuration that is entered through the IoT Management application. |
| **RS-VESSELCALLSIGN** | **Must** | **The vessel identification section shall contain the vessel call sign.**  The call sign is configuration data; it is part of the vessel configuration that is entered through the IoT Management application. |
| **RS-VESSELLOCATION** | **Must** | **The vessel identification section shall contain the vessel location.**   * **In a graphical map, and** * **In words** (Hamburg, in the example) |

## Maintenance dates

The Maintenance Dates section informs the user about the planned maintenance dates for a set of presented information elements: overhaul date, hull cleaning date, propeller cleaning date, dry dock date. Also, the installation date is presented.

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| **Req. ID** | **Prio** | **Description** |
| **RS-INSTALL-DATE** | **Must** | **The maintenance dates section shall contain the vessel installation date.**  The vessel installation date is configuration data; it is part of the vessel configuration that is entered through the IoT Management application. |
| **RS-OVERHAUL-DATE** | **Must** | **The maintenance dates section shall contain the planned overhaul maintenance date.**  The overhaul maintenance date is service configuration data; it is entered through the Vessel Management application. |
| **RS-HULLCLEANINNG-DATE** | **Must** | **The maintenance dates section shall contain the planned hull cleaning maintenance date**  The hull cleaning maintenance date is service configuration data; it is entered through the Vessel Management application. |
| **RS-PROPELLERCLEANINNG-DATE** | **Must** | **The maintenance dates section shall contain the planned propeller cleaning maintenance date**  The propeller cleaning maintenance date is service configuration data; it is entered through the Vessel Management application. |
| **RS-DRYDOCK-DATE** | **Must** | **The maintenance dates section shall contain the planned dry dock maintenance date**  The dry dock maintenance date is service configuration data; it is entered through the Vessel Management application. |
| **RS-PLANNEDDATE-INDICATION** |  | **Planned maintenance dates that occur in the past and planned maintenance dates that occur in the future shall be visualized different**  E.g. Passed planned dates in red; future planned dates in green. |

## Hull and propeller

The hull and propeller section gives maintenance information that is relevant for hull and propeller of the vessels. Currently two information elements are foreseen: historic trend of fuel usage and hull and propeller fouling indication.

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| **Req. ID** | **Prio** | **Description** |
| **RS-HULL-FUEL** | **Must** | **The hull and propeller section shall contain an historic trend of monthly fuel consumption**  This is the summarized fuel consumption per month. This historic trend shall have a maximum overview of 24 months, if available. |
| **RS-HULL-FOULING** | **Must** | **The hull and propeller section shall contain an historic trend of monthly fouling indications**  @Leon: not sure how this is modelled. One fouling indication per ship, or separate indications per vessels? |

## machinery maintenance indication

The machinery maintenance indication section presents for all the main machinery a set of actual maintenance related information elements.

Main machinery is defined as propulsion engines, generators, winches and deck crane

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| **Req. ID** | **Prio** | **Description** |
| **RS-MMI-GEN** | **Must** | **The machinery maintenance indication section shall contain information blocks**   * **For each propulsion engine on the vessel** * **For each generator on the vessel** * **For each winch on the vessel** * **For each deck crane on the vessel**   This requires configuration of the main machinery per vessel. This is foreseen in the IoT Management application. |
| **RS-MMI-INFOBLOCK** | **Must** | **Each information block in the machinery maintenance indication section shall contain the following identification parameters:**   * **Component type {Engine, Crane, Winch, Generator}** * **Unit number** * **Location {SB, PS, …}**   These are configuration items. This is foreseen in the IoT Management application. The unit number follows a t.b.d. classification scheme. |
| **RS-MMI-INFOBLOCK-ENGINE** | **Must** | **Each propulsion engine information block presents the following maintenance indication information elements:**   * **Running hours** * **Total fuel consumption** * **Engine age**   *How to calculate these values?* |
| **RS-MMI-INFOBLOCK-GENERATOR** | **Must** | **Each generator information block presents the following maintenance indication information elements:**   * **Running hours** * **Total fuel consumption** * **Generator age**   *How to calculate these values?* |
| **RS-MMI-INFOBLOCK-CRANE** | **Must** | **Each deck crane information block presents the following maintenance indication information elements:**   * **Running hours** * **Total number of cycles** * **Crane age**   *How to calculate these values?* |
| **RS-MMI-INFOBLOCK-WINCH** | **Must** | **Each winch information block presents the following maintenance indication information elements:**   * **Running hours** * **Total number of *cycles*** * **Winch age**   *How to calculate these values?* |

## Machinery Condition

The machinery condition of a ship presents

* An alarm list (description, date and time, severity)
* Related parameters (oil pressure, oil temperature, power supply voltage and many more)

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| --- | --- | --- |
| **Req. ID** | **Prio** | **Description** |
| **RS-MC-ALARMLIST** | **Must** | **The machinery condition section shall contain an alarm list.** |
| **RS-MC-PARAMLIST** | **Must** | **The machinery condition section shall contain a parameter list.**  The parameters have threshold values that result in alarms. |
| **RS-MC-ALARM** | **Must** | **The alarm list shall contain alarms; each alarm consists of**   * **A description** * **A value field (can be empty)** * **A timestamp** * **A severity (major, minor, informational)** |
| **RS-MC-PARAM** | **Must** | **The parameter list shall contain an information element per parameter, describing**   * **Parameter name** * **Parameter level (textual)** * **Parameter level (graphical)** * **Parameter severity indication** |
| **RS-MC-PARAMITEMS** | **Must** | **The following parameter items are required:**   * **Cooling temperature,** * **FO D pressure,** * **FF D pressure,** * **Power Supply voltage level,** * **Boost pressure,** * **Oil temperature,** * **Oil pressure**   *To be determined to which subsystem they belong. And whether you need PS and SB side.* |

# Vessel Management requirements

The Vessel Management web application is to be used by service managers and service engineers to set the relevant service maintenance date parameters for the vessels.

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| **Req. ID** | **Prio** | **Description** |
| **RS-VESSELMANAGEMENT** | **Must** | **Vessel Management allows users to assign maintenance dates to vessels**  Users can select vessels that are in his scope, and set maintenance dates to the selected vessel. The GUI is to be defined; might be a grid with input forms. |
| **RS-VM-DATES** | **Must** | **Users can set vessel maintenance dates per vessel:**   * **Overhaul date** * **Hull cleaning date** * **Propeller cleaning date** * **Dry dock date**   Whether a user is entitled to add new maintenance dates depends on his assigned role. |
| **RS-UPDATE-RS** | **Must** | **New maintenance date information is shown on all web devices that have the Remote Services application running for the designated vessel.** |